Spoilage issues in Pinot Noir

During the 1990s, a high number of the microbiological instability issues investigated by the AWRI's helpdesk were associated with bottled Pinot Noir wines (Bruer *et al*. 1998). Looking at today's stats, Pinot Noir wines still represent a significant proportion of the microbiological spoilage issues submitted to the helpdesk. In this article **Adrian Coulter** presents answers to common questions about microbial spoilage in Pinot Noir.

What are the microorganisms responsible for spoilage in Pinot Noir?

More often than not, more than one microorganism is present in spoilt wines and sometimes a 'smorgasbord' of microorganisms is present! Although all of the common oenological microorganisms have been isolated from affected wines, spoilage is usually due to lactic acid bacteria (LAB), typically *Lactobacillus*, and/or acetic acid bacteria (AAB).

What compositional aspects tend to contribute to spoilage?

The spoilt Pinot Noir wines investigated by the helpdesk typically have one or more of the following characteristics:

- high pH (>3.7)
- insufficient concentration of free sulfur dioxide (SO_2) (<0.4mg/L molecular)
- high levels of yeast and/or bacteria at bottling
- presence of residual sugar
- presence of residual malic acid.

What are the winemaking variables that tend to contribute to spoilage?

Some of the winemaking factors that can influence spoilage in Pinot Noir include:

- insufficient racking or poor settling
- a reluctance to apply treatments which might decrease colour density, such as filtration, fining and SO_2 addition
- minimal or inadequate filtration.

What are the key strategies to reduce the incidence of spoilage?

Adjust pH

Given the influence pH has on physical and microbial stability, it is recommended to add tartaric acid at the juice stage to bring the pH down to between 3.4 and 3.5, regardless of the amount of acid required to achieve this. Adjusting pH at the juice stage is recommended because adjusting the pH of a high-pH wine can present problems due to the nature of tartaric acid dissociation equilibria (Cowey 2018). It is also recommended to monitor pH during fermentation on skins and, if the pH increases, adjust to maintain it in the 3.4 to 3.5 range. Winemakers should not be too concerned about high titratable acidity (TA) at this stage, as the TA should decrease over time due to KHT precipitation. In any case, it is often easier to deacidify a low-pH wine than acidify a high-pH one.

> **When it comes to adding SO_2, it's considered more effective to make one or two big 'hits' of SO_2, rather than making lots of small additions, which may give microorganisms a chance to acclimatise.**

Minimise residual nutrients

Ensuring that both primary and malolactic fermentations proceed to completion are important to minimise the levels of residual sugar and malic acid that can support microbial growth. Having a strong yeast starter culture and aeration of the ferment when it's most active (combined with a nitrogen addition), as well as avoiding temperature shock, especially when pressing, will help minimise the level of residual sugar. It is also important to check residual sugar levels using an accurate assay, rather than assuming that primary fermentation is complete. The chance of a successful malolactic fermentation (MLF) is increased when various wine compositional parameters (e.g. pH, alcohol and SO_2 levels) are favourable and when the bacteria culture has been prepared using an acclimatisation procedure before inoculation.

Ensure appropriate level of SO_2

The AWRI generally recommends that a concentration of 0.6mg/L of molecular SO_2 be achieved in red wines to inhibit the growth of bacteria and yeast (and the concentration of molecular SO_2 is dependent on wine pH). So, when calculating how much SO_2 to add, it is essential to take into account the wine's pH. When it comes to adding SO_2, it's considered more effective to make one or two big 'hits' of SO_2, rather than making lots of small additions, which may give microorganisms a chance to acclimatise. The AWRI advises making a large addition of SO_2 once MLF is complete (confirmed by analysis), enough to achieve 0.6mg/L of molecular SO_2.

Know what that haze is

If a wine is intended to be bottled without filtration, it makes sense to conduct microbial analysis to find out if there are viable microorganisms present. Even if no residual sugar and/or malic acid remain in the wine, LAB can metabolise other substrates, for example pentose sugars and glycerol, and cause spoilage in-bottle. If viable microorganisms are present, such as LAB or *Brettanomyces* yeast, sterile filtration is recommended. The chance of having viable microorganisms in wine at the time of bottling can be minimised by following the advice outlined in this column, as well as through a combination of repeated, careful rackings and fining treatments if required.

References

Bruer, N.G.C.; Coulter, A.D. and Graves, P.J. (1999) Microbiological spoilage of Pinot Noir wines after bottling [poster].

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Cowey, G. (2018) Ask the AWRI: Winemaking with high pH, high TA and high potassium fruit. *Aust. N.Z. Grapegrower Winemaker* 657: 80-81.

For further information on wine spoilage or any other technical grapegrowing or winemaking issue, contact the AWRI helpdesk on helpdesk@awri.com.au or 08 8313 6600. GW